The Role of Cadastre in Agricultural Reform Applications of Turkey: Case Study of Trabzon Province

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Key words: Cadastre, Agricultural Reform, National Registry of Farmers (NRF), Turkey, Trabzon.

SUMMARY

In Turkey, in order to adapt EU's Common Agricultural Policy (CAP), nationwide agricultural reform applications have been implemented since 2000. These applications have been financed by the World Bank (WB) within the Agricultural Reform Implementation Project (ARIP). ARIP is a crucial project in restructuring process of Turkish agricultural sector. It is composed of four main components. The component of Direct Income Support (DIS) is regarded as the most important one. Therefore, the government has been focused on the implementation of this component. However, complete land records are of critical importance for the sustainable implementation of DIS applications. Considering this fact, initiatives to form the National Registry of Farmers (NRF) system was started in 2001. The NRF includes both the records of farmers and the land claimed to be used for agricultural purposes. The system is currently dependent on the declarations by farmers. So far, about three millions of farmers have been registered within the system. The NRF is based on the cadastral registration information (titles) declared by farmers. However, the system has not any functional spatial component (reference system). On the other hand, the Turkish cadastral organisation has not completed the re-structuring process to meet the basic reference system requirement of the NRF. Therefore, in the control stage of NRF data and thus in the applications of DIS, some conflicts have been encountered. In this study, in selected pilot areas situated in Trabzon Province of Turkey, using cadastral data as a potential reference system for NRF as well as geometrically-corrected aerial photographs or satellite images (orthophoto/orthoimage), the effectiveness of the NRF system was analyzed. In this analysis, it was determined that only 30% of the actual agricultural fields had been registered within the NRF. Besides, it was also determined that, some parcels, which are partly used for agricultural purposes, were declared as if they were fully used. With this study, it was also shown that, it is possible to determine unregistered areas without any declarations by farmers taking the advantage of using digital cadastral data and orthophotography.

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1. INTRODUCTION

Agricultural sector has undertaken very important roles in the economic and social development of Turkey. This sector covers 15% of Turkish national income (URL-1, 2003) and holds nearly 35% of the employment (Eraktan, 2002). Today, active nationwide agricultural policies which are parallel to those in EU are being implemented. Agricultural policies in EU, on the other hand, have been developing in the framework of the CAP. CAP has always been in a change to reach better policies. Out of the CAP changes in time, Direct Income Support (DIS) regime which was started as of 1992 is a milestone (Delince, 2001; EC, 2003; URL-3, 2004). In EU, forming an Integrated Administration and Control System (IACS) including a concrete Land Parcel Identification System (LPIS) have been legally indicated for the management of both DIS applications and other agricultural subsidies.

Agricultural DIS regime, in Turkey, was put on the agenda in 1999 when the processes to join the EU accelerated. After this date, required project work and pilot applications were carried out with the supervision of the Ministry of Agriculture and Rural Affairs (MARA). Then, a project titled Agricultural Reform Implementation Project (ARIP) was started in 2001 with the financial support by the World Bank (WB) (Kutlu, 2002; URL-4, 2005). In the implementation of this project in Turkey, due to the fact that farmers have been registered to National Record of Farmers (NRF) alphanumerical database, some data management and checking problems have been experienced.

Dale and McLaughin (1988) define a land parcel as a basic unit for land related activities of human being. Likewise, EU countries, in their LPIS systems, used cadastral data, if available, directly as a reference system or as ancillary data in addition to Digital Ortho Photos (DOP) or Digital Ortho Images (DOI) (EC, 2002). However, the NRF system of Turkey has not a spatial reference system even though the NRF records are largely based on the title information. With this case study implemented in Trabzon Province of Turkey, taking the advantage of Digital Cadastre Map (DCM) coverage as a reference system and DOP&DOI of the study areas as a reliable source of land use information, the success of current NRF system was analyzed.

2. AGRICULTURAL REFORM APPLICATIONS IN TURKEY

In 2001, Turkey started the implementation of a new project titled Agricultural Reform Implementation Project (ARIP) as an initial preparation for the CAP of EU. This project financed by the World Bank starts in June 2001 and ends in December 2007. The project has a total of four main components (URL-2, 2005; Kutlu, 2002; Anonymous, 2002). In Table 1, these components and brief descriptions are presented.

Current applications of agricultural reforms in Turkey are focused largely on the first component of the ARIP project—forming a National Registry of Farmers (NRF) via Direct Income Support (DIS) regime. Since the DIS will allow the government to disengage from its current support mechanisms in a politically acceptable and humane way, this component is at the heart of the whole program (WB, 2001). Because components C and D sections in the table are related to cooperation issues, they are not discussed in this paper.

Table 1. ARIP project components and their descriptions

Comp.	Title	Description
A	Direct Income Support (DIS)	The objective of this component is to set up a National Registry of Farmers (NRF) capable of identifying farmers who are eligible for payments under the DIS and delivering those payments.
B	Farmer Transition	The objective of this component is to cover the cost of converting from previously highly supported crops. Currently the most serious problems are with hazelnut and tobacco.
C	Cooperatives and Unions	Includes the structural reform of the agricultural sales cooperatives and unions.
D	Support Services	Includes public information campaign to provide information about the reforms, advisory services and project coordination.

Currently the NRF system is used for national support schemes, environmental measures, organic farming applications, farm product insurance systems and even for bank credits to farmers as well as DIS applications. The system is based on declarations by farmers. It operates on an internet based central software application. It enables the provincial MARA directorates to enter or update the information submitted by farmers. So far, within the NRF system, 2.75 million farmers and 16.7 million hectares of land are registered. The declarations by farmers are largely dependent on the titles of their agricultural land. In the regions where cadastral records are not available, they are dependent on farmer declarations and approval by the special commission governed by the village headman (*in Turkish* Muhtar).

When titles are available, a complete administrative cross-check is possible just taking the advantage of unique numbers of cadastral land parcels and shares of the owners. On the other hand, in the absence of titles, some intentional misuses of the situation are possible. The determination of possible misuses is not possible for the central administration and even for the provincial administration unless a complete on-the-spot check is executed. The facts that DCM coverage is not available for the regions where titles are available and that, in the absence of titles, any special reference is not available make impossible for authorities to implement on-the-spot checks. In addition, Digital Ortho Photo (DOP) or Digital Ortho Image (DOI) coverage is not used as an ancillary data in NRF system. This kind of information is proved to be a main source of information for both on-the-spot checks (JRC, 2001) and for the interpretation of agricultural land use patterns. So, the NRF system relying on the information by farmers has not a concrete control mechanism and is in need of a nationwide spatial reference system.

3. SPATIAL DATA INFRASTRUCTURE INITIATIVES FOR AGRICULTURAL REFORMS

Conventional cadastre maps are currently not suitable to be used as spatial bases for NRF system. As such, different surveying methods, coordinate systems, base types and sheet scales have been used in producing cadastral maps (Kokturk, 2002; Cete and Yomralioglu, 2004). This fact causes uncertainties in digitizing and using these different kinds of data sources for the same purpose. Therefore, initiatives by the General Directorate of Land Registry and Cadastre (GDLRC) were commenced as a subcomponent to Component A of the ARIP. These initiatives are aimed at forming a modern Digital Cadastre Map (DCM) coverage all over the country. The activities of this context cover both completing initial cadastre works in the areas not registered in modern cadastre system and digitizing cadastre map sheets in the areas initial cadastre works were completed previously. In addition, in line with these activities, GDLRC has been implementing a project titled Land Registry and Cadastre Information System (LRCIS, *in Turkish* TAKBIS) in an attempt to automate nationwide services of the directorate and to share cadastral data with other foundations. However, both initiatives are in their initial phases and considerable amount of time is required before they are fully functional.

4. CASE STUDY

4.1 Study Areas

One of the study areas is Isiklar City (Municipality) situated in Akcaabat District of Trabzon Province, and the other is Bengisu Village situated in Trabzon Province. These areas are shown in Figure 1.

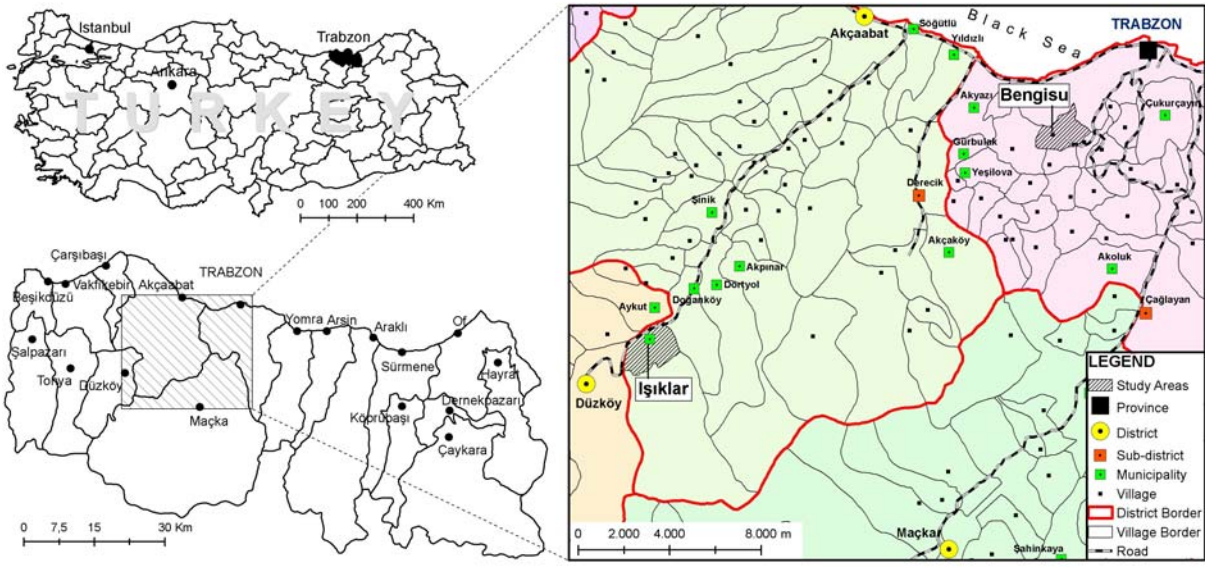

Figure 1. Locations of the study areas on the maps of Trabzon Province and Turkey

Isiklar has a total area of 2500 hectares. In this administrative unit, initial cadastre works on an area of 340 hectares that is subject to ownership were completed in 1985. According to census data of 2000, the unit has a total population of 5165. Bengisu Village has a total area of 260 hectares. Initial cadastre works covering all the area of this administrative unit were also completed in 1985. As for the population of this unit, census data of 2000 suggests a population of 1126.

4.2 Materials Used for the Study

The materials used for the implementation of the comparisons and analyses in this study are listed below.

- Digital Cadastre Map (DCM) of Isiklar City was acquired by digitizing map sheets of the region. This digital map includes 2406 land parcels and covers an area of 340 hectares.
- Detailed NRF Data of Isiklar City was acquired from the Provincial Directorate of MARA in Trabzon Province. This data set is for 2003 and includes all the information related to both farmers and their agricultural land recorded in the NRF system.
- Summary NRF Data of both Isiklar City and Bengisu Village were also acquired from the Provincial Directorate of MARA, and each includes total planted and seasonally cultivated agricultural areas recorded in the NRF system of 2003.
- Digital Ortho Photo (DOP) of Isiklar City was produced by Inan (2004) complying with the standards specified by JRC (2001) using 1/16000 scale color infrared aerial photos taken in 2002.
- Digital Ortho Image (DOI) of Bengisu Village was also produced by Inan (2004) complying with JRC (2001) standards using Pan-Sharpened (1x1m pixel size) IKONOS imagery sensed in 2003.

4.3 Assessment of NRF records in the Study Areas

Agricultural land use maps of both Isiklar City and Bengisu Village were produced in order to use in comparison processes. DOP and DOI of two study areas were digitized and classified for this purpose (*see* Fig.2-a,b). When the land use map of Isiklar City were examined, it was determined that there is a total agricultural area of 225.2 hectares. This total area consists of both cultivated and planted agricultural areas. On the other hand, the summary NRF data of 2003 suggests that a total area of 70.6 hectares was declared to be used for agricultural purposes (Table 2). There is a difference of 154.6 hectares between the actual area of land and the records in the NRF system. In other words, only 31 percent of the agricultural areas was able to be recorded within the NRF system. In Bengisu Village, an identical situation prevails. Indeed, it was determined that there are 164.7 hectares of planted (hazelnut) area, 26.7 hectares of cultivated area and thus a total agricultural area of 191.4 hectares in accordance with the land use map of the village. However, the NRF data of 2003 suggests 52.7 hectares of planted (hazelnut) area, 9.8 hectares of cultivated area and thus a total agricultural area of 62.5 hectares. There is a difference of 128.9 hectares between the actual area of land and the records in the NRF system (Table 2). In other words, only 33 percent of the agricultural areas was able to be recorded within the NRF system.

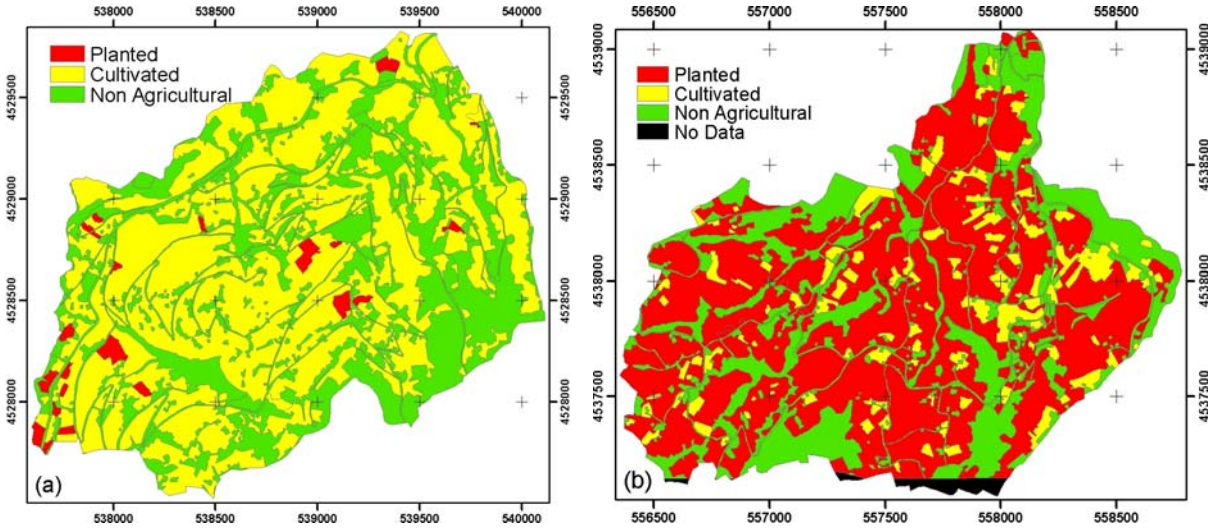

Figure 2. Digital Agricultural Land Use Maps of Isiklar City (a) and Bengisu Village (b)

Table 2. Comparison of agricultural land use maps with NRF data of pilot areas

Study Area	Land Cover/Use Class	Area (Agri. Land Use) (hectares)	Area (NRF) (hectares)	Difference	
				(hectares)	(%)
Isiklar	Planted	8.3	7.3	1.0	12
	Cultivated	216.9	63.3	153.6	71
	Total	*225.2*	*70.6*	***154.6***	***69***
Bengisu	Planted	164.7	52.7	112.0	68
	Cultivated	26.7	9.8	16.9	63
	Total	*191.4*	*62.5*	***128.9***	***67***

4.4 Land Parcel Analyses of Isiklar City

In the NRF data of Isiklar City, 448 parcels were declared to be used totally or partially for agricultural purposes. The total area of these parcels is 78.9 hectares and, out of this area, a total area of 70.6 hectares was declared to be used for agricultural purposes. When NRF records were linked with DCM of this study area, it was possible querying and seeing declared and undeclared parcels on DCM. The resulting map generated from this query is presented in Figure 3. As a result of this query, it is determined that 408 cadastral parcels out of 448 declared parcels match with the NRF records. That is to say, 40 parcels declared in the NRF records could not be represented spatially in DCM of the region. The reason for this may possibly be the combinations of the facts that updated cadastral map sheets were not readily accessible and that the control phase of the digitization process could not be done properly. This situation, which is possible for any digitization process of cadastral map sheets, indicates the importance of the mission undertaken by GDLRC.

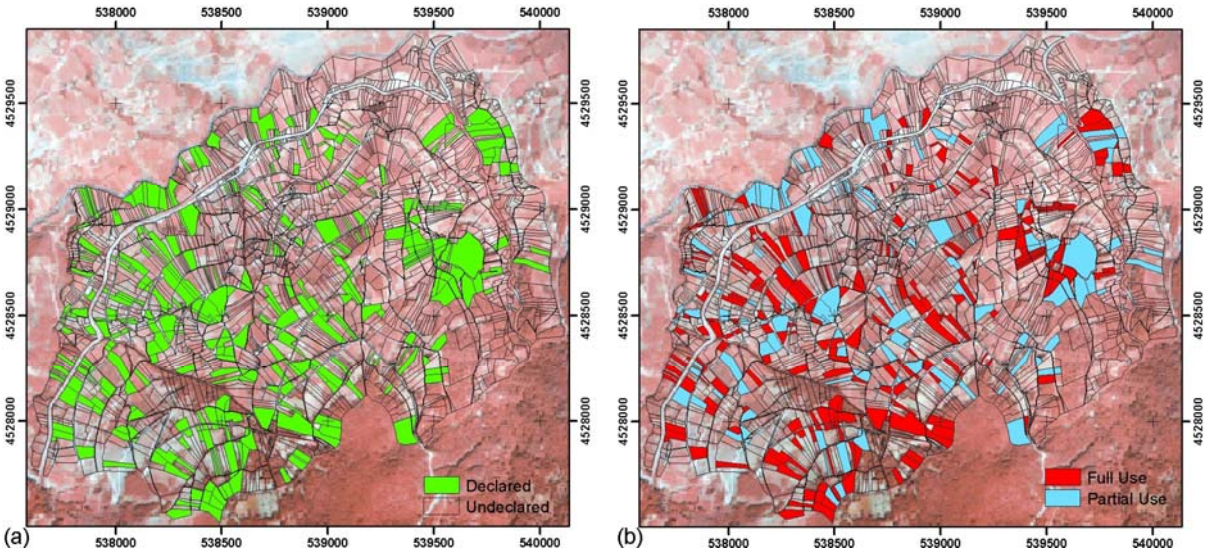

Figure 3. Representation of "declared" and "undeclared" land parcels in the NRF system on DCM overlaid with DOP of Isiklar City (a); Representation of "full use" and "partial use" of declared land parcels in the NRF system (b).

After matching cadastral parcels and NRF records, the parcels which were declared to be fully used for agricultural purposes and the parcels which were declared to be used partially were queried and classified as "Full Use" and "Partial Use" respectively. Then, the areas declared to be used for agricultural purposes in the NRF system and the corresponding areas determined by overlaying land use map with DCM of the study area were compared (Table 3). As a result of this comparison, considerable anomalies between the areas declared in the NRF system and the actual areas extracted from land use map were determined (Table 3). These figures indicate that both the farmers who declared that they fully use their land for agricultural purposes and the farmers who claim a partial usage on their land caused an anomaly amounting to one fourth of NRF records. It is a fact that current NRF system is far from determining these kinds of anomalies in the absence of DCM coverage as a basic reference system.

Table 3. Anomalies of declared land with actual agricultural land use pattern

Type of Declaration	Num. of Parcels	Total Area	Area Declared in NRF	Area by Land Cover/Use Map	(%) Anomaly
Full Use	277	41.8	41.8	31.3	25.1
Partial Use	131	32.6	25.3	19.6	22.5
Total	408	74.4	67.1	50.9	24.1

Apart from the analyses conducted in this study, with the determination of undeclared land (*see* Fig. 3-a), it will be possible to determine portions of land actually used for agricultural purposes for each undeclared land parcel. Even, some extra precaution can be taken to promote the users of undeclared parcels to contribute to NRF system.

5. CONCLUSION

It was revealed with this study that some farmers made excessive declarations to the NRF system and some others did not declare their land for some different reasons. Accordingly, it was proved that current NRF system is not adequate for a complete and error-free registration of both farmers and their agricultural land use information. It was also proved with this study that cadastral data is of critical importance in determining mis-declarations by farmers and none declared land parcels. In fact, with the availability of DCM coverage all over the country as a reference system for the NRF system, on-the-spot checks will be possible for the provincial directorates of MARA. In addition, overly excessive declarations by farmers where cadastre records did not previously exist will be completely prevented. Furthermore, taking the advantage of DOP-DOI coverage as an ancillary reference data to DCM coverage, a concrete analyses and management of the NRF system will be possible. So, nationwide DCM coverage should be made available as soon as possible. In this context, the GDLRC has an important role with its initiatives to produce DCM coverage both in the framework of ARIP and LRCIS project.

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BIOGRAPHICAL NOTES

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